

VMware vCenter Operations Manager Advanced Getting Started Guide

vCenter Operations Manager Advanced 5.0

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VMware vCenter Operations Manager Advanced Getting Started Guide

The *VMware vCenter Operations Manager Advanced Getting Started Guide* provides information about the VMware® vCenter™ Operations Manager planning process.

Intended Audience

This guide is intended for administrators of VMware vSphere who want to familiarize themselves with planning workflow tasks to monitor and manage the performance of the vCenter Operations Manager virtual environment.

vCenter Operations Manager Features

vCenter Operations Manager collects performance data from each object at every level of your virtual environment, from individual virtual machines and disk drives to entire clusters and datacenters. It stores and analyzes the data, and uses that analysis to provide real-time information about problems, or potential problems, anywhere in your virtual environment.

vCenter Operations Manager works with existing VMware products to add the following functions.

- Combines key metrics into single scores for environmental health and efficiency and capacity risk.
- Calculates the range of normal behavior for every metric and highlights abnormalities. Adjusts the dynamic thresholds as incoming data allows it to better define the normal values for a metric.
- Presents graphical representations of current and historical states of your entire virtual environment or selected parts of it.
- Displays information about changes in the hierarchy of your virtual environment. For example, when a virtual machine is moved to a different ESX host, you can see how these changes affect the performance of the objects involved.

This chapter includes the following topics:

- [“Main Concepts of vCenter Operations Manager,”](#) on page 7
- [“Metric Concepts for vCenter Operations Manager Planning,”](#) on page 8

Main Concepts of vCenter Operations Manager

vCenter Operations Manager uses certain concepts that can help you understand the product, its interface, and how to use it.

Attributes and Metrics

vCenter Operations Manager collects several kinds of data for each inventory object. For example, for a virtual machine, vCenter Operations Manager might receive data about free disk space, CPU load, and available memory. Each type of data that vCenter Operations Manager collects is called an attribute. An instance of an attribute for a specific inventory object is called a metric. For example, free memory for a specific virtual machine is a metric.

For each metric, vCenter Operations Manager collects and stores multiple readings over time. For example, the vCenter Operations Manager server polls for information about the CPU load for each virtual machine once every five minutes. Each piece of data that vCenter Operations Manager collects is called a metric value.

Dynamic Thresholds

vCenter Operations Manager defines dynamic thresholds for every metric based on the current and historical values of the metric. The normal range of values for a metric can differ on different days at different times because of regular cycles of use and behavior. vCenter Operations Manager tracks these normal value cycles and sets the dynamic thresholds accordingly. High metric values that are normal at one time might indicate potential problems at other times. For example, high CPU use on Friday afternoons, when weekly reports are generated, is normal. The same value on Sunday morning, when nobody is at the office, might indicate a problem.

vCenter Operations Manager continuously adjusts the dynamic thresholds. The new incoming data allows vCenter Operations Manager to better define what value is normal for a metric. The dynamic thresholds add context to metrics that allows vCenter Operations Manager to distinguish between normal and abnormal behavior.

Dynamic thresholds eliminate the need for the manual effort required to configure hard thresholds for hundreds or thousands of metrics. More importantly, they are more accurate than hard thresholds. Dynamic thresholds allow vCenter Operations Manager to detect deviations based on the actual normal behavior of an object and not on an arbitrary set of limits.

The analytics algorithms take seven days to calculate the initial values for dynamic thresholds. Dynamic thresholds appear as line segments under the bar graphs for use metrics on the Details page and on the Scoreboard page. The length and the position of the dynamic threshold line segment depends on the calculated normal values for the selected use metrics. Dynamic thresholds also appear as shaded gray areas of the use metrics graphs on the All Metrics page.

Hard Thresholds

Unlike dynamic thresholds, hard thresholds are fixed values that you enter to define what is normal behaviour for an object. These arbitrary values do not change over time unless you change them manually. You cannot fix hard thresholds with vCenter Operations Manager.

Key Performance Indicators

vCenter Operations Manager defines attributes that are critical to the performance of an object as key performance indicators (KPI). KPI are weighted more heavily in the calculations that determine the health of an object. Graphs of KPI performance appear before other metrics in several areas of the product.

Probable Causes

If the condition of the currently selected object is degraded, you can view a list of probable causes for this degradation on the Details page. vCenter Operations Manager analyzes the metrics behavior of all objects that are related to the currently selected object to determine the probable reason for its health degradation.

The probable cause metrics might be about the object itself, about its child objects, or about other related objects. They are the conditions, or symptoms, that are the first steps that led to the degraded condition of the object. For example, an increase in CPU load by a virtual machine might lead to performance problems for other virtual machines on the same ESX host, or for the ESX host itself.

Metric Concepts for vCenter Operations Manager Planning

Preparing to monitor your environment with vCenter Operations Manager involves some familiarity with metrics that help you to identify a problem.

vCenter Server presents a use-based model of metrics. vCenter Operations Manager presents a demand-based model of metrics. Some knowledge of the metrics that affect the data and graphs is useful to determine what to do next in a workflow.

Table 1-1. Major Metric Concepts

Metric	Description
Provisioned	<p>Amount of a resource that the user configures.</p> <p>The provisioned metric might apply to the amount of physical memory for a host or the number of vCPUs for a virtual machine.</p>
Usable	<p>Actual amount of a resource that the object can use.</p> <p>The usable amount is less than or equal to the provisioned amount. The difference between the provisioned amount and usable amount stems from factors such as hardware capacity and virtualization overhead. This overhead might include the memory that an ESX host uses to run the host, to support reservations for virtual machines, and to add a buffer for high availability.</p> <p>The usable metric does not apply to virtual machines.</p>
Usage	<p>Amount of a resource that an object consumes.</p> <p>The usage amount is less than or equal to the usable amount.</p>
Demand	<p>Amount of a physical resource that the object might consume without any existing constraints.</p> <p>An object becomes constrained because of under-provisioning or contention with other consumers of the resource. A virtual machine might require 10GB of memory but can only get 5GB because the virtual machine must share resources with other virtual machines on the host.</p> <p>When the demand amount is less than the usage amount, the environment might have wasted resources. When the demand amount is greater than the usage amount, the environment might incur latency and exhibit decreased performance.</p>
Contention	<p>Effect of the difference between the amount of the resource that the object requires and the amount of the resource that the object gets.</p> <p>This metric measures the effect of conflict for a resource between consumers. Contention measures latency or the amount of time it takes to gain access to a resource. This measurement accounts for dropped packets for networking.</p>
Limit	<p>Maximum amount that an object can obtain from a resource.</p> <p>The limit sets the upper bound for CPU, memory, or disk I/O resources that you allocate and configure in vCenter Server.</p> <p>The usage amount is less than or equal to the limit amount.</p> <p>The demand amount can be greater than the limit amount.</p> <p>The limit amount is less than or equal to the provisioned amount.</p> <p>The default limit amount is unlimited.</p> <p>Rules: $Usage \leq Limit$</p> <p>Demand can be greater than Limit .</p>

Table 1-1. Major Metric Concepts (Continued)

Metric	Description
Reservation	<p>Guaranteed amount of resources for an object.</p> <p>The object does not start without this reserved amount. The default amount is 0.</p>
Entitlement	<p>Amount of a resource that a virtual machine can use based on the relative priority of that consumer set by the virtualization configuration.</p> <p>This metric is a function of provisioned resources, limit, reservation, shares, and demand. Shares involve proportional weighting that indicates the importance of a virtual machine.</p> <p>The entitlement amount is less than or equal to the limit amount. The only case in which entitlement is less than provisioned is when the total provisioned amount is greater than total capacity.</p> <p>The entitlement metric applies only to virtual machines.</p> <p>Rules: Entitlement <= Limit <= Provisioned</p> <p>Entitlement >= Reservations</p>

Preparing to Monitor a vCenter Operations Manager Virtual Environment

2

Preparing to monitor the vCenter Operations Manager virtual environment involves understanding the vCenter Operations Manager badges and the key metric concepts.

This chapter includes the following topics:










- [“Object Type Icons in the Inventory Pane,”](#) on page 11
- [“Badge Concepts for vCenter Operations Manager Planning,”](#) on page 12
- [“Major Badges in vCenter Operations Manager,”](#) on page 12
- [“Working with Metrics and Charts on the All Metrics Tab,”](#) on page 20

Object Type Icons in the Inventory Pane

All objects that vCenter Operations Manager monitors are listed in the inventory pane.

vCenter Operations Manager uses specific icons so that you can distinguish between virtual machines, ESX hosts, and other objects in the inventory.

Table 2-1. Object Type Icons

Icon	Description
	World The World object is a logical container for all monitored objects in vCenter Operations Manager.
	vCenter Server system
	Datacenter
	Cluster
	ESX host that is in powered-off state
	ESX host that is in powered-on state
	Datastore
	Virtual machine that is in powered-off state
	Virtual machine that is in powered-on state

By default, objects in the inventory pane are grouped by hosts and clusters. You can select **Datastores** from the drop-down menu at the top of the inventory pane to switch the way objects are grouped.

Badge Concepts for vCenter Operations Manager Planning

vCenter Operations Manager uses badges to illustrate derived metrics to provide an overview of the state of the virtual environment or an individual object. These badges serve as focus points to narrow the scope of a potential problem and provide details about the cause of the problem.

vCenter Operations Manager provides major and minor badges that are color coded and range from a healthy green to a potentially problematic yellow, orange, or red. Badges are organized in a simple hierarchy in which the scores of minor badges contribute to the scores of major badges.

Scores might reflect a healthy state or a potential problem depending on the type of badge. For example, low scores for health, time remaining, and capacity remaining might indicate potential problems, while low scores for faults, stress, or anomalies indicate a normal state.

You can use the **Dashboard** tab for an overview of the performance and condition of your virtual infrastructure. The information you see on the **Dashboard** tab depends on the object you select in the navigation tree. See [“Object Type Icons in the Inventory Pane,”](#) on page 11.

You can expand the panes on the Dashboard to view information about a specific badge. You can also double-click badges to view details about the metrics that affect badge scores.

Major Badges in vCenter Operations Manager

vCenter Operations Manager generates major badges that start a workflow and help you to identify health, capacity risk, and efficiency issues.

Each major badge contains minor badges. vCenter Operations Manager calculates major badges based on the state of the minor badges.

Defining Health to Measure the Overall State of the Environment

The vCenter Operations Manager Health badge serves as the first high-level indicator of the state of the virtual environment.

The Health badge indicates immediate problems that might require your attention. It helps you identify the current health of your system. vCenter Operations Manager combines workload, anomalies, and faults to assess the overall health and to determine whether the workload level is expected in that environment. A low health score might indicate a potential problem.

The overall health score for an object ranges from 0 (bad) to 100 (good). vCenter Operations Manager calculates the Health score using the scores of the sub-badges that the Health badge contains. Faults are given precedence in the Health score because they describe existing problems, while Workload and Anomalies are combined to identify performance problems. This approach ensures that the score of the Health badge reflects the actual state of the object, without overexposing or underestimating problems.

The Health score ranges between 0 (bad) and 100 (good). The badge changes its color based on the badge score thresholds that are set by the vCenter Operations Manager administrator.

Table 2-2. Object Health States







Badge Icon	Description	User Action
	The health of the object is normal.	No attention required.
	The object is experiencing some level of problems.	Check and take appropriate action.

Table 2-2. Object Health States (Continued)

Badge Icon	Description	User Action
	The object might have serious problems.	Check and take appropriate action as soon as possible.
	The object is either not functioning properly or will stop functioning soon.	Act immediately.
	No data is available for any of the metrics for the time period.	
	The object is offline.	

A vCenter Operations Manager administrator can change the badge score thresholds. For example, a green Health badge can indicate a score above 80 instead of 75, as set by default.







Using the Workload Badge Under the Health Badge

The vCenter Operations Manager Workload badge measures how hard an object must work for resources. A workload score of 0 indicates that a resource is not being used and a score that approaches or exceeds 100 might cause performance problems.

Workload is an absolute measurement that calculates the demand for a resource divided by the capacity of an object. Resources might include CPU, memory, disk I/O, or network I/O.

The Workload score ranges from 0 (good) to over 100 (bad). The badge changes its color based on the badge score thresholds that are set by the vCenter Operations Manager administrator.

Table 2-3. Object Workload States

Badge Icon	Description	User Action
	Workload on the object is not excessive.	No attention required.
	The object is experiencing some high resource workloads.	Check and take appropriate action.
	Workload on the object is approaching its capacity in at least one area.	Check and take appropriate action as soon as possible.
	Workload on the object is at or over its capacity in one or more areas.	Act immediately to avoid or correct problems.
	No data is available for any of the metrics for the time period.	
	The object is offline.	

A vCenter Operations Manager administrator can change the badge score thresholds. For example, a green Workload badge can indicate a score below 80 instead of 85, as set by default.

Using the Anomalies Badge Under the Health Badge







The vCenter Operations Manager Anomalies badge measures the extent of abnormal behavior for an object based on historical metrics data. A high number of anomalies might indicate a potential issue.

A low Anomalies score indicates that an object is behaving in accordance with its established historical parameters. Most or all of the object metrics, especially its KPIs, are within their thresholds. Because changes in behavior often indicate developing problems, if the metrics of an object go outside the calculated thresholds, the anomalies score for the object grows. As more metrics breach the thresholds, anomalies continue to increase. Violations by KPI metrics increase the Anomalies score more than violations by non-KPI metrics. A high number of anomalies usually indicates a problem or at least a situation that requires your attention.

Anomalies involves the number of statistics that fall outside of the expected behavior trends while Workload involves an absolute measurement of how hard an object works for resources. Both Anomalies and Workload are useful when attempting to find a probable cause and troubleshooting performance problems.

The Anomalies score ranges between 0 (good) and 100 (bad). The badge changes its color based on the badge score thresholds that are set by the vCenter Operations Manager administrator.

Table 2-4. Object Anomalies States

Badge Icon	Description	User Action
	The Anomalies score is normal.	No attention required.
	The Anomalies score exceeds the normal range.	Check and take appropriate action.
	The Anomalies score is very high.	Check and take appropriate action as soon as possible.
	Most of the metrics are beyond their thresholds. This object might not be working properly or will stop working soon.	Act immediately to avoid or correct problems.
	No data is available for any of the metrics for the time period.	
	The object is offline.	

A vCenter Operations Manager administrator can change the badge score thresholds. For example, a green Anomalies badge can indicate a score below 60 instead of 50, as set by default.







Using the Faults Badge Under the Health Badge

The vCenter Operations Manager Faults badge measure the degree of problems that the object might experience based on events retrieved from the vCenter Server.

The events that might generate faults include the loss of redundancy in NICs or HBAs, memory checksum errors, high availability failover, or Common Information Model (CIM) events, which require your immediate attention.

The Faults score ranges between 0 (no faults) and 100 (critical faults). The badge changes its color based on the badge score thresholds that are set by the vCenter Operations Manager administrator.

Table 2-5. Object Faults States

Badge Icon	Description	User Action
	No faults are registered on the selected object.	No attention required.
	Faults of low importance are registered on the selected object.	Check and take appropriate action.
	Faults of high importance are registered on the selected object.	Check and take appropriate action as soon as possible.
	Faults of critical importance are registered on the selected object.	Act immediately to avoid or correct problems.
	No data is available for any of the metrics for the time period.	
	The object is offline.	

A vCenter Operations Manager administrator can change the badge score thresholds. For example, a green Faults badge can indicate a score below 40 instead of 25, as set by default.

Defining Risk to Assess Future Problems in vCenter Operations Manager







The vCenter Operations Manager Risk badge indicates a potential performance problem in the near future that might affect the virtual environment.

Risk involves the time remaining, capacity remaining, and stress factors that account for the time buffer, remaining virtual machines, and degree of habitual high workload.

vCenter Operations Manager calculates the risk score using the scores of the sub-badges that the Risk badge contains. The formula that is applied to calculate the risk score is inverse geometric weighted mean.

The overall Risk score for an object ranges between 0 (no risk) to 100 (serious risk). The badge changes its color based on the badge score thresholds that are set by the vCenter Operations Manager administrator.

Table 2-6. Object Risk States

Badge Icon	Description	User Action
	The selected object has no current problems. No problems are expected in the future.	No attention required.
	There is a low chance of future problems or a potential problem might occur in the far future.	Check and take appropriate action.
	There is a chance of a more serious problem or a problem might occur in the medium-term future.	Check and take appropriate action as soon as possible.
	The chances of a serious future problem are high or a problem might occur in the near future.	Act immediately.
	No data is available for any of the metrics for the time period.	
	The object is offline.	

Using the Time Remaining Badge Under the Risk Badge







The vCenter Operations Manager Time Remaining badge measures the time before a resource associated with an object reaches capacity. This badge indicates the available timeframe to provision or load balance the physical or virtual resources for a selected object.

vCenter Operations Manager calculates the Time Remaining score as a percentage of time that is remaining for each compute resource compared to the provisioning buffer you set in the Configuration dialog box. By default, the Time Remaining score provisioning buffer is 30 days. If even one of the compute resources has less capacity than the provisioned buffer, the Time Remaining score is 0.

For example, if the provisioning buffer is set to 30 days, and the object that you selected has CPU resources for 81 days, memory resources for 5 days, disk I/O resources for 200 days, and network I/O resources for more than one year, the Time Remaining score is 0, because one of the resources has capacity for less than 30 days.

The Time Remaining score ranges between 0 (bad) and 100 (good). The badge changes its color based on the badge score thresholds that are set by the vCenter Operations Manager administrator.

Table 2-7. Time Remaining States

Badge Icon	Description	User Action
	The number of days that remain is much higher than the score provisioning buffer you specified.	No attention required.
	The number of days that remain is higher than the score provisioning buffer, but is less than two times the buffer you specified.	Check and take appropriate action.
	The number of days that remain is higher than the score provisioning buffer, but approaches the buffer you specified.	Check and take appropriate action as soon as possible.
	The number of days that remain is lower than the score provisioning buffer you specified. The selected object might have exhausted some of its resources or will exhaust them soon.	Act immediately.
	No data is available for the Time Remaining score.	
	The object is offline.	

Using the Capacity Remaining Badge Under the Risk Badge







The vCenter Operations Manager Capacity Remaining badge measures the number of additional virtual machines that the object can handle before reaching capacity.

The remaining virtual machines count represents the number of virtual machines that can be deployed on the selected object, based on the current amount of unused resources and the average virtual machine profile for the last "n" weeks. The remaining virtual machines count is a function of the same compute resources of CPU, Mem, Disk I/O, Net I/O, and Disk Space that are used to calculate the Time Remaining score.

vCenter Operations Manager calculates the Capacity Remaining score as a percentage of the remaining virtual machines count compared to the total number of virtual machines that can be deployed on the selected object.

The Capacity Remaining score ranges between 0 (bad) and 100 (good). The badge changes its color based on the badge score thresholds that are set by the vCenter Operations Manager administrator.

Table 2-8. Object Capacity States

Icon	Description	User Action
	The object is not expected to reach its capacity limits within the next 120 days. You can deploy a large number of virtual machines on the selected object.	No attention required.
	The object is expected to reach its capacity limits in less than 120 but more than 60 days. You can deploy a limited number of virtual machines to the selected object.	Check and take appropriate action.
	The object is expected to reach its capacity limits in less than 60 but more than 30 days. You can deploy very few virtual machines to the selected object.	Check and take appropriate action as soon as possible.
	The object is expected to reach its capacity limits within the next 30 days. The selected object cannot accommodate more virtual machines.	Act immediately.
	No data is available for any of the metrics for the time period.	
	The object is offline.	

A vCenter Operations Manager administrator can change the default badge score thresholds. For example, green can indicate a score above 60 instead of 50.

Using the Stress Badge Under the Risk Badge







The vCenter Operations Manager Stress badge measures a long-term workload that might involve undersized virtual machines or ESX hosts or an excessive number of virtual machines. These conditions might generate performance problems over time.

While workload is based on an instantaneous value, stress measures statistics over a longer period of time.

The Stress score helps you identify hosts and virtual machines that do not have enough resources allocated, or hosts that are running too many virtual machines. A high Stress score does not imply a current performance problem, but highlights potential for future performance problems.

The Stress score ranges between 0 (good) and 100 (bad). The badge changes its color based on the badge score thresholds that are set by the vCenter Operations Manager administrator.

Table 2-9. Stress States

Badge Icon	Description	User Action
	The Stress score is normal.	No attention required.
	Some of the object resources are not enough to meet the demands.	Check and take appropriate action.
	The object is experiencing regular resource shortage.	Check and take appropriate action as soon as possible.
	Most of the resources on the object are constantly insufficient. The object might stop functioning properly.	Act immediately.
	No data is available for the Stress score.	
	The object is offline.	







Defining Efficiency to Optimize the Environment

The vCenter Operations Manager Efficiency badge identifies the potential opportunities to improve the performance or cost of your virtual environment.

Efficiency accounts for the waste and infrastructure density in your environment. A large amount of wasted resources combined with a low density ratio generates a poor efficiency score.

The Efficiency score ranges between 0 (bad) and 100 (good). The badge changes its color based on the badge score thresholds that are set by the vCenter Operations Manager administrator.

Table 2-10. Object Efficiency States







Badge Icon	Description	User Action
	The efficiency is good. The resource use on the selected object is optimal.	No attention required.
	The efficiency is good, but can be improved. Some resources are not fully used.	Select Planning > Views to identify underused resources.
	The resources on the selected object are not used in the most optimal way.	Select Planning > Views to identify underused resources.
	The efficiency is bad. Many resources are wasted.	Try optimizing the resource use to avoid resource waste.
	No data is available for any of the metrics for the time period.	
	The object is offline.	

Using the Reclaimable Waste Badge Under the Efficiency Badge

The vCenter Operations Manager Reclaimable Waste badge accounts for resource types such as CPU, memory, or disk, and measures the extent of excessive provisioning for an object. It also identifies the amount of resources that you can reclaim and provision to other objects in your virtual environment.

The Reclaimable Waste score ranges between 0 (good) and 100 (bad). The badge changes its color based on the badge score thresholds that are set by the vCenter Operations Manager administrator.

Table 2-11. Reclaimable Waste States

Badge Icon	Description	User Action
	No resources are wasted on the selected object.	No attention required.
	Some resource can be used better.	Select Planning > Views to identify underused resources.
	Many resources are underused.	Select Planning > Views to identify underused resources.
	Most of the resources on the selected object are wasted.	Select Planning > Views to identify underused resources.
	No data is available for any of the metrics for the time period.	
	The object is offline.	

A vCenter Operations Manager administrator can change the badge score thresholds. For example, a green badge can indicate a score below 50 instead of 75, as set by default.

Using the Density Badge Under the Efficiency Badge

The vCenter Operations Manager Density badge measures consolidation ratios to assess cost savings. You can assess the behavior and performance of a virtual machine and related applications to maximize the consolidation ratio without affecting the performance or service level agreements.

The density score is the ratio of the actual density to an ideal density based on the demand, the amount of virtual capacity, and the amount of physical usable capacity. Density calculates the amount of resources that you can provision before contention or conflict for a resource occurs between objects. The ratios account for the number of virtual machines to host, the number of virtual CPUs to physical CPU, and the amount of virtual memory to physical memory.

The Density score ranges between 0 (bad) and 100 (good). The badge changes its color based on the badge score thresholds that are set by the vCenter Operations Manager administrator.

Table 2-12. Object Density States







Badge Icon	Description	User Action
	The resource consolidation is good.	No attention required.
	Some resources are not fully consolidated.	Select Planning > Views to identify resource consolidation opportunities.
	The consolidation for many resources is low.	Select Planning > Views to identify resource consolidation opportunities.

Table 2-12. Object Density States (Continued)

Badge Icon	Description	User Action
	The resource consolidation is extremely low.	Select Planning > Views to identify resource consolidation opportunities.
	No data is available for any of the metrics for the time period.	
	The object is offline.	

A vCenter Operations Manager administrator can change the badge score thresholds. For example, a green Density badge can indicate a score above 40 instead of 25, as set by default.

Working with Metrics and Charts on the All Metrics Tab

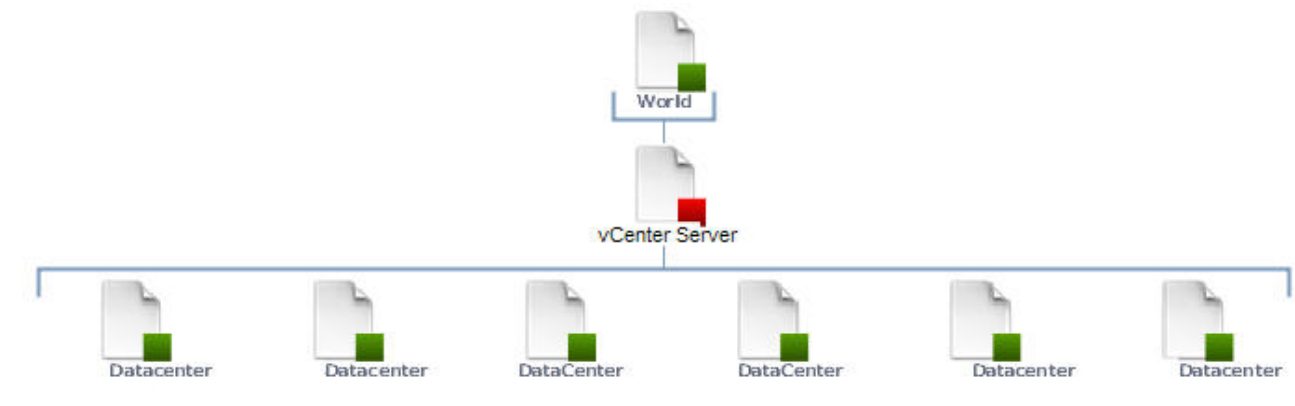
You can check the location of an object in the hierarchy and select metrics to view graphs of their historic values for a period you define.

You can use the panes on the **All Metrics** tab under the **Operations** tab to search metrics and view metric graphs.

The Health Tree Pane

The Health Tree pane displays the location of the currently selected object in the hierarchy of your virtual infrastructure. You can check all parent and child objects related to the currently selected object.

For example, the sample hierarchy shows the parent and child objects in the virtual infrastructure. The red icon indicates a presence of a potential problem in the **vCenter Server** object. You can investigate the probable cause of the problem from the **Dashboard** tab.



The Metric Selector Pane

The Metric Selector pane contains a list of all metric groups that are applicable to the currently selected object. Metric groups contain all the metrics that are applicable to the currently selected object. The list of available metrics is updated depending on the object you selected in the Health Tree pane.

The Search text box allows you find metrics using part of their names and filter the search results by metric groups, instances or metric types.








For example, if you type % in the **Search** text box and select **Metric** from the drop-down menu, the search result contains only metrics that are calculated as percentage.

The Metric Chart Pane

The Metric Chart pane displays the graphs of the metrics you select from the Metric Selector pane. You can view as many graphs as you want. You can control the appearance of metric graphs and create screenshots by using the buttons in the Metric Chart pane.

Health Tree Pane Buttons

In the **All Metrics** tab under the **Operations** tab, you can use the buttons of the Health Tree pane to control the appearance of monitored objects in the health tree.








Button Tooltip	Icon	Description
Zoom to fit		Resizes the view so all related objects fit in the health tree area. All previous zoom operations are discarded.
Enter pan mode		Allows you to pan the health tree.
Show values on point		Enables metric value tooltips so that they appear when you point the graph with the mouse pointer.
Enter zoom mode		Allows you to enlarge sections of the health tree by drawing rectangles to enclose the area to enlarge.
Zoom in		Enlarges the middle of the health tree by one level.
Zoom out		Reduces the middle of the health tree by one level.
Reset to initial object		Reset the Health Tree pane to the original view for the selected object..

Metric Chart Pane Buttons

On the All Metrics page, you can use the buttons of the Metric Chart pane to customize the appearance of charts, and add or delete charts.

Global Control Buttons

These buttons control the appearance of all graphs that you open in the Metric Chart pane.

Button Tooltip	Icon	Description
Separate graphs by period		Splits the current metrics graph in separate graphs by periods based on your selection in the time and date widget.
Show/hide Y-axis		Displays or hides the Y axis of the graph to display metric values.
Show/hide metric line		Displays or hides the line that connects the data points in the metric graph.
Show/hide trend line		Displays or hides the line that represents the trend of the currently selected metric in the graph.
Show 24-hour dynamic thresholds		Displays or hides the calculated dynamic threshold values for a 24-hour period in the graph.
Show entire period dynamic thresholds		Displays or hides the calculated dynamic threshold values for the entire monitoring period in the graph.
Show/hide anomalies		Displays or hides the anomalies that occurred during the selected period in the graph.





















Button Tooltip	Icon	Description
Retrieve complete metric values		In zoom mode, displays the values of the selected metric when you move the mouse pointer over the graph.
Enable X-axis zoom		Allows you to enlarge the selected area of the graph only on the X axis while the Y axis remains static.
Enable Y-axis zoom		Allows you to enlarge the selected area of the graph only on the Y axis while the X axis remains static.
Zoom to fit		Resizes the charts so the entire graphs for all selected periods fit in the chart area. All previous zooms are discarded.
Zoom Y-axis to dynamic thresholds		Resizes the Y axis of the metric chart so that the highest and the lowest values on the axis are the highest and the lowest values of the dynamic threshold calculated for this metric.
Compress Y-axis		Shortens the graph.
Zoom all graphs together		Resizes all metric graphs that are open in the Metric Chart pane.
Enter zoom mode		Enables resizing of the metric graphs on both axis Y and axis X.
Enter pan mode		When in zoom mode, allows you to drag the enlarged section of the graph around to view higher, lower, earlier, or later values of the metric.
Show value on point		Enables metric value tooltips so that they appear when you point the graph with the mouse pointer.
Refresh		Reloads all graphs in the Metric Chart.
Turn auto refresh on/off		Activates or deactivates the auto refresh option for metric charts.
Open date/time controls		Opens the date and time widget for you to select the period to display on the metric graph.
Remove all graphs		Deletes all graphs from the Metric Chart pane.

Chart-Specific Buttons

These buttons control the specific chart to which they are attached. Some chart-specific buttons are available only when you view graphs split by period.

Button Tooltip	Icon	Description
Move up		When multiple graphs are open in the Metric Chart pane, this button moves the selected graph one place up. Available only for split graphs view.
Move down		When multiple graphs are open in the Metric Chart pane, this button moves the selected graph one place down. Available only for split graphs view.
Save a snapshot		Creates a real-size snapshot of the selected graph and opens a File Download window for you to open or save the PNG file.
Save a full screen snapshot		Creates an enlarged snapshot of the selected graph and opens a File Download window for you to open or save the PNG file.
Download comma separated data		Creates a comma separated values file with the metric data for the selected graph and opens a File Download window for you to open or save the CSV file. Available only for split graphs view.
Close		Deletes the selected graph from the Metric Chart pane. Available only for split graphs view.

Planning the vCenter Operations Manager Workflow

3

Planning your workflow in a vCenter Operations Manager virtual environment involves reacting to day-to-day problems and initiating ways to proactively prevent problems and find opportunities for resource optimization and cost savings.

Use the vCenter Operations Manager badges to help guide your workflow.

This chapter includes the following topics:

- [“Monitoring Day-to-Day Activity in vCenter Operations Manager,”](#) on page 24
- [“Identify an Overall Health Issue,”](#) on page 24
- [“Determine the Timeframe and Nature of a Health Issue,”](#) on page 24
- [“Determine Whether the Environment Operates as Expected,”](#) on page 25
- [“Identify the Source of Performance Degradation,”](#) on page 26
- [“Identify Events that Occurred when an Object Experienced Performance Degradation,”](#) on page 26
- [“Identify the Top Resource Consumers,”](#) on page 27
- [“Determine the Extent of a Performance Degradation,”](#) on page 27
- [“Determine When an Object Might Run Out of Resources,”](#) on page 28
- [“Determine the Cause of a Problem with a Specific Object,”](#) on page 28
- [“Address a Problem with a Specific Virtual Machine,”](#) on page 29
- [“Address a Problem with a Specific Datastore,”](#) on page 30
- [“Identify Objects with Stressed Capacity,”](#) on page 30
- [“Identify Stressed Objects with vCenter Operations Manager,”](#) on page 31
- [“Identify the Underlying Memory Resource Problem for Clusters and Hosts,”](#) on page 31
- [“Identify the Underlying Memory Resource Problem for a Virtual Machine,”](#) on page 32
- [“Determine the Percentage of Used and Remaining Capacity to Assess Current Needs,”](#) on page 32

Monitoring Day-to-Day Activity in vCenter Operations Manager

Monitoring day-to-day activity in the vCenter Operations Manager virtual environment involves evaluating the overall health of the system and reacting to potential problems at the current time.

Identify an Overall Health Issue

The Health badge is the indicator of a potential problem in the virtual environment that vCenter Operations Manager monitors.

By default, the **Dashboard** tab displays information about the World object. You can select another object in the inventory pane to check for immediate health problems on the object. (You can also use the Search text box at the upper right, entering part or all of the object's name, to locate an object.)

Prerequisites

In the vCenter Operations Manager interface, verify that the **Dashboard** tab is open.

Procedure

- 1 On the **Dashboard** tab, check the color of the Health badge.
- 2 If the color of the Health badge is other than green, click the arrow under the badge to expand the detailed view.

The Health pane displays the sub-badges for Workload, Anomalies, and Faults. Badge colors help you identify the possible cause of the problem.

- 3 Identify the cause of the health problem depending on the object that you selected in the inventory pane.

Selected Object	Action
■ World	a In the Health pane, identify the sub-badge that indicates poor score.
■ vCenter Server	b Click the Environment tab under the Operations tab.
■ Datacenter	c Select the sub-badge that indicated poor score on the Dashboard page.
■ Cluster	d Check the Environment tab for badges of related objects that are indicating problems.
	e Double-click an object that indicates poor score.
	f On the Details tab under the Operations tab, navigate to the object that the badge represents and review the resource data, key metrics, and badge-specific information.
■ ESX host	a In the Health pane, identify the sub-badge that indicates poor score and click it.
■ Virtual machine	b On the Details tab under the Operations tab, review the resource data, key metrics, and badge-specific information.
■ Datastore	

What to do next

How you proceed depends on your findings on the Details page.

Determine the Timeframe and Nature of a Health Issue

The Dashboard provides information to help you determine the nature and timeframe of a health issue, including whether it is a transient or chronic problem.

By default, the **Dashboard** tab displays information about the World object. You can select another object in the inventory pane to check for immediate health problems on the object. (You can also use the Search text box at the upper right, entering part or all of the object's name, to locate an object.)

Prerequisites

In the vCenter Operations Manager interface, verify that the **Dashboard** tab is open.

Procedure

- 1 In the Health pane, check whether the Weather Map of Health displays colors other than green. (The weather map is most appropriate for grouped objects such as the World, vCenters, and Datacenters.)
Colors that dominate the map over the past six hours indicate a larger trend.
- 2 If a trend exists, click the **Health** badge.
The **Details** tab under the **Operations** tab appears.
- 3 To identify the type of problem an object has, click the **Workload**, **Anomalies**, or **Faults** badge and point to the metric values for more information.
- 4 Click the **Dashboard** tab and expand the Risk pane to check the Stress graph.
The graph in the Stress pane displays the resource demand over the past week and helps you determine when the peak demand occurred.
- 5 If a particular peak, such as a 6 p.m. peak, exists that might require investigation, click the **Stress** badge.
The **Views** tab under the **Planning** page appears.

What to do next

Click the **Views** tab under the **Planning** tab to investigate possible causes of the problem and assess resources allocation.

Determine Whether the Environment Operates as Expected

Anomalies in vCenter Operations Manager provide insight into the behavior of your environment and help you to determine whether a high workload might still reflect a normal or expected load.

By default, the **Dashboard** tab displays information about the World object. You can select another object in the inventory pane to check for immediate health problems on the object. (You can also use the Search text box at the upper right, entering part or all of the object's name, to locate an object.)

In the Anomalies pane, the blue line represents the actual level of anomalies for the selected object. The gray line represents the noise threshold line that shows the normal level of anomalies for the selected object.

Prerequisites

In the vCenter Operations Manager interface, verify that the **Dashboard** tab is open.

Procedure

- 1 In the inventory pane, select the object that you want to inspect.
- 2 Click the arrow under the **Health** badge to expand the detailed view.
- 3 In the Anomalies pane, check the badge score and the noise threshold line.
If the blue line of the abnormal metric count is far below the noise line, the level of anomalies is normal.
If the blue line of abnormal metric count approaches or surpasses the noise line, the object might be experiencing health degradation.
- 4 If you see an abnormal level of anomalies, click the **Anomalies** badge.
The **Details** tab opens and you can continue investigating the problem.

What to do next

On the **Details** tab under the **Operations** tab, you can check metric values to identify the resource that might be causing the high Anomalies score. Depending on which resource indicates abnormal operation, check the Key Metrics pane for further information.

Identify the Source of Performance Degradation

Identifying the probable source of performance degradation in vCenter Operations Manager involves investigating the percentage of CPU, memory, disks, and network resources usage in the virtual environment.

Prerequisites

Verify that you are logged in to a vSphere Client and that vCenter Operations Manager is open.

Procedure

- 1 In the inventory pane, select the object that you want to inspect.
- 2 Click the **Environment** tab under the **Operations** tab, and select the **Workload** badge.
- 3 To filter the objects and related objects by state, click the **Status Filter** buttons to view only the red, orange, and yellow states.
- 4 Point to the object state other than green to view the workload details.
- 5 Double-click a related object to investigate why it is experiencing heavy resource demands.
- 6 On the **Details** tab under the **Operations** tab, you can check the percentage of resource use that might be causing the high Workload score.
- 7 To locate the available resources of the object and related objects, click the **Scoreboard** tab under the **Operations** tab, and select the **Workload** badge.
The **Scoreboard** tab displays the workload scores for all ESX hosts in the cluster. By default, ESX hosts with a high workload are presented as large badges.
- 8 To filter the objects and related objects by state, click the **Status Filter** buttons to view only the red, orange, and yellow states.
- 9 Click the object that indicates a poor score.
- 10 On the **Details** tab under the **Operations** tab, review the Resources pane and the Workload graphs to assess the potential capacity to move virtual machines to balance the workload.

What to do next

Click the **Analysis** tab to compare the performance of selected objects across the virtual infrastructure. You can use this information to balance the load across ESX hosts and virtual machines.

Identify Events that Occurred when an Object Experienced Performance Degradation

Identifying when the abnormal events started to cause performance degradation and the trend of the problem in vCenter Operations Manager involves examining the Health scores of the object and its related objects.

In the **Events** tab under the **Operations** tab, you can view graphs of health-related badge scores and events that occurred on the selected object and its related objects. When you notice that the score of a badge changed after an event occurred, you can click that event to view more details.

Prerequisites

Verify that you are logged in to a vSphere Client and that vCenter Operations Manager is open.

Procedure

- 1 In the inventory pane, select the object that you want to inspect.
- 2 If the color of the Health badge is other than green, click the **Events** tab under the **Operations** tab to see events that occurred as far back as a month.
Use the buttons above the badge score graph to control what you see on the **Events** tab.
- 3 Point to the abnormal event in the Events graph to view the time range when the problem started to decrease the possible causes that contributed to the poor badge score.

What to do next

Depending on the details of the event, investigate the problem in vCenter Server.

Identify the Top Resource Consumers

To address high use levels in your virtual environment, identify the top resource consumers.

Prerequisites

Verify that you are logged in to a vSphere Client and that vCenter Operations Manager is open.

Procedure

- 1 Click the **Analysis** tab to view the heat map gallery.
- 2 Depending on the resource, select a CPU, memory, network, or storage focus area.
- 3 To view a heat map that shows contention by use, select the host, virtual machine, or cluster object.
The larger the size of the heat map tile, the higher the use.
Click the **Analysis** tab to view the heat map gallery.
- 4 If a color other than green indicates a potential problem, click **Details** for the object in the pop-up window to investigate the resources for that object.

What to do next

Identify the top consumers of resources such as CPU or memory.

Determine the Extent of a Performance Degradation

After you identify the performance problem, determine the effect on the rest of the object population and the consistency of the issue.

Prerequisites

Verify that you are logged in to a vSphere Client and that vCenter Operations Manager is open.

Procedure

- 1 In the inventory pane, select the object that you want to inspect.
- 2 Click the Health badge if it is other than green.
- 3 In the **Related Objects** pane of the **Details** tab, verify the color of the **Parent Objects** and **Peer Objects** icons.
 - If the selected object is the only object with a high score, no effect exists on the **Peer Objects** or **Child Objects**.
 - If the Parent Object is in a red, yellow, or orange state, click the Parent Object to investigate the details.

Determine When an Object Might Run Out of Resources

The Time Remaining pane under the **Risks** badge provides a summary of when an object in the virtual environment might run out of resources such as disk space, memory, CPU, or network.

Prerequisites

Verify that you are logged in to a vSphere Client and that vCenter Operations Manager is open.

Procedure

- 1 In the inventory pane, select the object that you want to inspect.
- 2 Click the **Risk** tab under the **Dashboard** tab, and click the arrow under the badge to expand the detailed view.
- 3 In the Time Remaining pane, identify the resource that is approaching capacity.
- 4 Click the **Summary** tab under the **Planning** tab.
- 5 In the Objects and Resources pane, view a breakdown of the remaining capacity and trend information for each resource.

The Time Remaining value represents an aggregated forecast based on the number of virtual machines and indicates when capacity might equal resource use.

What to do next

To further investigate which resources constrain the virtual machine count, click the **Views** tab and select the **Virtual Machine Capacity - Summary** view.

Determine the Cause of a Problem with a Specific Object

Determining a cause of a problem with a specific object involves identifying whether the problem is transient or chronic in the virtual environment.

Prerequisites

Verify that you are logged in to a vSphere Client and that vCenter Operations Manager is open.

Procedure

- 1 In the inventory pane, select the object that you want to inspect.
- 2 Check the **Health**, **Risk** and **Efficiency** scores for the object.
 - If any of the scores are in the yellow, orange or red state, click the badge and investigate the sub-badges.
 - If the problem is because of Health, click the **Anomalies** badge to check for changes in expected behavior and the **Workload** badge to assess whether heavy resource demand exists.
- 3 Determine whether the demand experienced is for a specific time or whether it indicates a longer trend.
 - If the demand is transient, in the Health pane check the **Workload** badge.
 - If the problem results from chronic stress, in the Risk pane, check the **Stress** badge and click the object in the yellow, orange, or red state.
- 4 Click the **Summary** tab under the **Planning** tab to check the trend and forecast of CPU and memory demand for that object.

If the object is approaching capacity, consider moving some virtual machines to a less resource-constrained object.

- 5 Identify the top transient resource consumers, click the **Scoreboard** tab under the **Operations** tab, and select the **Workload** badge.
- 6 To filter the objects and related objects by Workload, click the **Status Filter** buttons to view only the red, orange, and yellow states.

You can prioritize the virtual machines with high Workload scores and move them to a less resource-constrained object.
- 7 Identify the resource consumers causing chronic stress, click the **Scoreboard** tab under the **Planning** tab, and select the **Stress** badge.
- 8 To filter the objects and related objects by Stress, click the **Status Filter** buttons to view only the red, orange, and yellow states.

You can prioritize the virtual machines with high Stress scores and move them to a less resource-constrained object.

What to do next

Identify a candidate object to which to move the problem virtual machines, click the **Analysis** tab, and select the **CPU** or **Memory** focus area depending on the constrained resource for the virtual machine object.

The heat map gallery helps identify candidate objects to which to move the virtual machines.

Address a Problem with a Specific Virtual Machine

Identifying the cause of a problem with a specific virtual machine involves investigating whether the problem is because of a constraining environment or because of changes in the guest operating system configuration.

Prerequisites

Verify that you are logged in to a vSphere Client and that vCenter Operations Manager is open.

Procedure

- 1 Search for the problematic virtual machine name in the vCenter Operations Manager search box.
- 2 Check the **Health**, **Risk** and **Efficiency** scores for the virtual machine.
 - If any of the badges are in the yellow, orange or red state, click the badge and investigate the subbadges.
 - If the problem is because of Health, check the **Anomalies** badge for changes in expected behavior and the **Workload** badge to assess whether heavy resource demand exists.
 - If the problem results from chronic stress, identify the constraining resource, such as CPU or memory, and click the **Stress** badge under the **Risk** pane for more information.
- 3 Click the **Summary** tab under the **Planning** tab to check the trend and forecast of CPU and memory demand for that virtual machine and the host that stores it.

If the forecast indicates a virtual machine resource demand problem, increase the resources allocated to the virtual machine.
- 4 Identify an object candidate to which to move the virtual machines, click the **Analysis** tab, and select the CPU or memory focus areas depending on the constrained resource for the virtual machine.

The heat map gallery helps identify cluster or host candidates to which to move the virtual machines.
- 5 If the problem results from changes to the guest operating system configuration, click the **Events** tab under the **Operations** tab for that virtual machine.

- 6 Examine the Events graph to see if the guest operating system change events or vSphere events caused the problem.

The guest change events will have a different icon shape.

Address a Problem with a Specific Datastore

Identifying the cause of a problem with a specific datastore involves investigating the I/O intensive virtual machines that adversely affect the disk space.

Prerequisites

Verify that you are logged in to a vSphere Client and that vCenter Operations Manager is open.

Procedure

- 1 Search for the problematic datastore name in the vCenter Operations Manager search box.
- 2 Check the **Health**, **Risk** and **Efficiency** scores for the datastore.
- 3 If the **Risk** badge shows that disk I/O is approaching capacity, click the **Summary** tab under the **Planning** tab to view the forecast of resources and constrained resources.
 - a On the **Analysis** tab, select the **Storage** focus area and the **Datastore** object to view **Datastore I/O Contention Sized by I/O Usage Grouped by Datastore** candidates that can accommodate the large disk I/O virtual machines.
 - b Move the disk I/O intensive virtual machines to another datastore.
- 4 If the datastore shows that disk space is approaching capacity, click the **Summary** tab under the **Planning** tab to view the breakdown of the resource capacity usage.

If snapshots occupy a significant amount of disk space, remove snapshots from some of the virtual machines on the datastore.
- 5 On the **Analysis** tab, select the **Storage** focus area and click **Datastore Space Waste Sized by Space Usage Grouped By Datacenter** to list the virtual machines in the datastore.

What to do next

Filter the virtual machines in the red, orange, and yellow states to identify the virtual machines that waste the most disk space.

Identify Objects with Stressed Capacity

Identify the stressed virtual machines, hosts, and clusters that might require more capacity.

Prerequisites

In the vCenter Operations Manager interface, verify that the **Dashboard** tab is open.

Procedure

- 1 Click the **Risk** tab under the **Dashboard** tab, and click the arrow under the badge to expand the detailed view.
- 2 To view the number of any stressed objects, select an object other than a datastore from the inventory pane.
- 3 To investigate the details of stressed objects, click the **Stress** badge.

The **Views** tab opens.
- 4 Select the **Stress** badge and access the view that corresponds to the object.

What to do next

Assign less work to the virtual machines or reconfigure the capacity appropriate to the virtual machine load.

Identify Stressed Objects with vCenter Operations Manager

Identify the stressed or undersized hosts and clusters to assign more capacity to those objects and optimize the load.

Prerequisites

Verify that you are logged in to a vSphere Client and that vCenter Operations Manager is open.

Procedure

- 1 In the inventory pane, select the object that you want to inspect.
- 2 Click the **View** tab under the **Planning** tab and select the **Stressed Hosts and Clusters - List** view.

The objects that appear in this view are overused and have fewer resources than the virtual machines demand.

What to do next

Assign less work to these hosts and clusters or reconfigure the capacity appropriate to the workload.

Identify the Underlying Memory Resource Problem for Clusters and Hosts

When you navigate through a vCenter Operations Manager workflow and identify a cluster or a host with a potential problem, check the CPU metric graphs to identify a possible resolution.

vCenter Operations Manager presents memory information that shows the metric relationships and the breakdown of the way the virtual machines use the memory resource.

Prerequisites

In the vCenter Operations Manager interface, verify that the **Dashboard** tab is open.

Procedure

- 1 In the inventory pane, select the object that you want to inspect.
- 2 Click the **Environment** tab under the **Operations** tab.
- 3 Click the **Workload** badge.
- 4 On the **Details** tab, analyze the memory metrics graphs for the virtual machine's workload.

Metric Relationship	Meaning
Demand is less than Usage	Virtual machines that receive memory relinquish that memory only when other virtual machines require it. The host does not reclaim memory from a virtual machine just because that memory is not in demand.
Memory Reserved is less than Memory Usable	It is acceptable for memory reservation to be less than usable memory. However, you might want to increase the reservation to guarantee resources in the range of normal demand.

What to do next

Understand the metric relationships in the CPU graphs and solve the underlying resource problem.

Identify the Underlying Memory Resource Problem for a Virtual Machine

When you navigate through a vCenter Operations Manager workflow and identify a virtual machine with a potential problem, you can resolve the underlying problem by using the memory metric data.

The CPU graphs for clusters and hosts show the Provisioned metric. The CPU graphs for virtual machines show the Entitlement metric. See [“Metric Concepts for vCenter Operations Manager Planning,”](#) on page 8.

Prerequisites

In the vCenter Operations Manager interface, verify that the **Dashboard** tab is open.

Procedure

- 1 In the inventory pane, select the object that you want to inspect.
- 2 Click the **Environment** tab under the **Operations** tab.
- 3 If the color of the badge is other than green, double-click it.
- 4 On the **Details** tab, select the **Workload** badge to analyze the memory metrics graphs.

Metric Relationship	Meaning
Demand is equal to Usage	Object has enough resources.
Demand is greater than Usage	Virtual machine might be in the process of waiting for CPU cycles.
Demand is greater than Usage and less than Provisioned	<p>This metric relationship indicates the following implications:</p> <ul style="list-style-type: none"> ■ Limits set on a virtual machine might cause the virtual machine to use less CPU resources than the demand. vCenter Operations Manager aggregates CPU metrics for virtual machines into the host CPU graph. ■ The CPU Dynamic Power Management in the BIOS might cause a CPU issue. Verify that the setting is in operating system control mode or disable the setting. ■ Virtual machines that are usually idle but happen to become busy at the same time might cause contention.

Understand the metric relationships in the memory graphs and solve the underlying resource problem for the virtual machine.

Determine the Percentage of Used and Remaining Capacity to Assess Current Needs

The Capacity Remaining pane under the **Risk** badge provides an overview of the used and remaining capacity for all objects except virtual machines.

You can use the bar chart under the Capacity Remaining badge to determine how much space you have in which to add new virtual machines to your environment.

Prerequisites

In the vCenter Operations Manager interface, verify that the **Dashboard** tab is open.

Procedure

- 1 In the inventory pane, select the object that you want to inspect.
- 2 Click the arrow under the **Risk** badge to expand the detailed view.
- 3 Under the **Capacity Remaining** badge, review the bar chart of used and remaining capacity.
- 4 To view more details about capacity-related metrics, click the **Capacity Remaining** badge.

- 5 On the **Views** tab, you can switch views to find aggregate information for used and total capacity, and capacity trends.

Preparing Proactive Workflows in vCenter Operations Manager

4

vCenter Operations Manager supports workflows for assessing both current issues and risks to future capacity for mission-critical objects as well.

Planning for capacity risk involves analyzing, optimizing, and forecasting data to determine how much capacity is available and whether you make efficient use of the infrastructure.

This chapter includes the following topics:

- [“Planning and Analyzing Data for Capacity Risk,”](#) on page 35
- [“Optimizing Data for Capacity,”](#) on page 39
- [“Forecasting Data for Capacity Risk,”](#) on page 43

Planning and Analyzing Data for Capacity Risk

Planning and analyzing data for capacity risk in vCenter Operations Manager involves using more than 20 predefined heat maps in the **Analysis** tab to compare commonly used metrics and create a plan to reduce waste in the virtual infrastructure.

Identify Clusters with the Space for Virtual Machines

Identify the clusters in a datacenter that have space for your next set of virtual machines.

Prerequisites

Verify that you are logged in to a vSphere Client and that vCenter Operations Manager is open.

Procedure

- 1 Click the **Analysis** tab.
- 2 In the heat map gallery, narrow the scope from the drop-down menu to display the remaining capacity for clusters.

Option	Action
Focus Area	Select Capacity .
Smallest Box Shows	Select Cluster .
Description	Select Cluster Capacity Remaining Sized By Workload Grouped By Datacenter .

- 3 Click the **Cluster Capacity Remaining Sized By Workload Grouped By Datacenter** view.
- 4 In the heat map, point to each cluster area to view the percentage of remaining capacity.

- 5 If a color other than green indicates a potential problem, click **Details** in the pop-up window to investigate the resources for the cluster or datacenter.

What to do next

Identify the green clusters with the most capacity to store virtual machines.

Identify the Source of Performance Degradation Through Heat Maps

Identifying the source of a performance problem in vCenter Operations Manager involves investigating cluster and host health heat maps.

Prerequisites

Verify that you are logged in to a vSphere Client and that vCenter Operations Manager is open.

Procedure

- 1 In the inventory pane, select the object that you want to inspect.
- 2 Click the **Analysis** tab.
- 3 In the heat map, narrow the scope from the drop-down menu to display the cluster and host health sized according to workload.

Option	Action
Focus Area	Section Health .
Smallest Box Shows	Section Host .
Description	Section Host Health Sized By Workload Grouped By Datacenter/Cluster .

- 4 Click the **Host Health Sized By Workload Grouped By Datacenter/Cluster** view.
- 5 In the heat map, point to the cluster area to view the percentage of remaining capacity.
A color other than green indicates a potential problem.
- 6 Click **Details** for the ESX host in the pop-up window to investigate the resources for that host.

What to do next

Adjust workloads to balance resources as necessary.

Identify Datastores with Space for Virtual Machines

Identify the datastores that have the most space for your next set of virtual machines.

Prerequisites

Verify that you are logged in to a vSphere Client and that vCenter Operations Manager is open.

Procedure

- 1 Click the **Analysis** tab.
- 2 In the heat map gallery, narrow the scope from the drop-down menu to display the datastore space.

Option	Action
Focus Area	Select Storage .
Smallest Box Shows	Select Datastore .
Description	Select Datastore Space Contention Sized By Total Space Grouped By Datacenter .

- 3 Click **Datastore Space Contention Sized By Total Space Grouped By Datacenter**.
- 4 In the heat map, point to each datacenter area to view the space statistics.
- 5 If a color other than green indicates a potential problem, click **Details** for the datastore in the pop-up window to investigate the disk space and disk I/O resources.

What to do next

Identify the datastores with the largest amount of available space for virtual machines.

Identify Datastores with Wasted Space

Identify datastores with the highest amount of wasted space that you can reclaim to improve the efficiency of your virtual infrastructure.

Prerequisites

Verify that you are logged in to a vSphere Client and that vCenter Operations Manager is open.

Procedure

- 1 Click the **Analysis** tab.
- 2 In the heat map gallery, narrow the scope from the drop-down menu to display the datastore waste.

Option	Action
Focus Area	Select Storage .
Smallest Box Shows	Select Datastore .
Description	Select Datastore Space Waste Sized by Space Usage Grouped by Datacenter .

- 3 Click the **Datastore Space Waste Sized by Space Usage Grouped by Datacenter** view.
- 4 In the heat map, point to each datacenter area to view the waste statistics.
- 5 If a color other than green indicates a potential problem, click **Details** for the datastore in the pop-up window to investigate the disk space and disk I/O resources.

What to do next

Identify the red, orange, or yellow datastores with the highest amount of wasted space.

Identify the Virtual Machines with Resource Waste Across Datastores

Identify the virtual machines that waste resources because of idle, oversized, or powered off virtual machine states or because of snapshots.

Prerequisites

Verify that you are logged in to a vSphere Client and that vCenter Operations Manager is open.

Procedure

- 1 Click the **Analysis** tab.

- 2 In the heat map gallery, narrow the scope from the drop-down menu to display the virtual machines with waste across datastores.

Option	Action
Focus Area	Select Storage .
Smallest Box Shows	Select VM .
Description	Select VM Sized by Space Usage Grouped By Datastore .

- 3 Click the **VM Sized by Space Usage Grouped By Datastore** view.
- 4 In the heat map, point to each virtual machine to view the waste statistics.
- 5 If a color other than green indicates a potential problem, click **Details** for the virtual machine in the pop-up window to investigate the disk space and disk I/O resources.

What to do next

Identify the red, orange, or yellow virtual machines with the highest amount of wasted space.

Identify the Host and Datastore with the Highest Latency

Identify the host and datastore pair with the highest latency to prevent a potential performance problem.

The heat map statistics for host I/O contention measure the latency or the time it takes to gain access to a resource.

Prerequisites

Verify that you are logged in to a vSphere Client and that vCenter Operations Manager is open.

Procedure

- 1 Click the **Analysis** tab.
- 2 In the heat map gallery, narrow the scope from the drop-down menu to display the datastore waste.

Option	Action
Focus Area	Select Storage .
Smallest Box Shows	Select Host .
Description	Select Host I/O Contention Sized by I/O Usage Grouped By Datastore .

- 3 Click the **Host I/O Contention Sized by I/O Usage Grouped By Datastore** view.
- 4 In the heat map, point to each datacenter area to view the latency statistics.

What to do next

Identify the host and datastore pair with the highest latency. Then determine how many hosts are using the datastore. If only one VM is using the datastore, or if more than one is but none of the others have high latency, there might be a problem with the host. Find out which VMs are on the host and what their storage usage is. If there are multiple hosts and they all are red, there might be a population pressure problem on the datastore. If this is the case, you should consider relocating some VMs.

Optimizing Data for Capacity

Optimizing data for capacity in vCenter Operations Manager involves finding opportunities for resource optimization and cost savings.

Determine How Efficiently You Use the Virtual Infrastructure

Determining the efficiency of the vCenter Operations Manager virtual infrastructure involves investigating the optimal, waste, and stressed virtual machines.

Prerequisites

In the vCenter Operations Manager interface, verify that the **Dashboard** tab is open.

Procedure

- 1 In the inventory pane, select the object that you want to inspect.
- 2 Click the arrow under the **Efficiency** badge to expand the detailed view.

The Efficiency pane displays the subbadges for **Reclaimable Waste** and **Density**.

What to do next

Examine the **Reclaimable Waste** and **Density** subbadge colors to identify whether resources are underused or partially consolidated.

Depending on your findings, you can investigate possible opportunities to improve efficiency.

Identify the Consolidation Ratio Trend for a Datacenter or Cluster

The consolidation ratio trend of a datacenter or cluster helps you understand the behavior and performance of your virtual machines and applications.

Prerequisites

Verify that you are logged in to a vSphere Client and that vCenter Operations Manager is open.

Procedure

- 1 In the inventory pane, select the object that you want to inspect.
- 2 Click the arrow under the **Efficiency** badge to expand the detailed view.
- 3 In the Density pane, compare the consolidation ratio trend in the VM : Host Ratio and the vCPU : CPU Ratio graphs.

If the ratios are below the optimal rate, the resource consolidation is low.

What to do next

To further investigate opportunities to optimize resource consolidation, click the **Views** tab under the **Planning** tab.

Determine Reclaimable Resources from Underused Objects

Determining reclaimable resources in vCenter Operations Manager involves identifying the objects that are underused.

Reclaimable waste is calculated for each resource type like CPU, memory, and disk, for each object in the virtual environment.

Prerequisites

Verify that you are logged in to a vSphere Client and that vCenter Operations Manager is open.

Procedure

- 1 In the inventory pane, select the object that you want to inspect.
- 2 Click the arrow under the **Efficiency** badge to expand the detailed view.
- 3 In the Reclaimable Waste pane, identify the CPU, memory, and disk resources that are underused and click the **Reclaimable Waste** badge.
- 4 In the **Views** tab, select the **Undersized Virtual Machines - List** view.

What to do next

Identify the virtual machines that are underused and provision fewer resources for them (or delete them).

Assess Virtual Machine Capacity Use

Identify optimization opportunities for a single virtual machine with vCenter Operations Manager.

Prerequisites

Verify that you are logged in to a vSphere Client and that vCenter Operations Manager is open.

Procedure

- 1 In the inventory pane, select the object that you want to inspect.
- 2 Click the **Views** tab under the **Planning** tab and select **Virtual Machine Capacity Usage - Summary**.

If the Host CPU and Memory use is high, the virtual machine does not have enough capacity to perform assigned work.

What to do next

Determine whether you can optimize performance for this virtual machine by assigning capacity to match typical load demand. If the virtual machine is powered off or idle, you can decommission the virtual machine to reclaim unused capacity.

Implement a strategy for optimizing use of this virtual machine based on the information you obtain from the view. Save your results by exporting the information to an export file.

Assess Virtual Machine Optimization Data

To optimize data with vCenter Operations Manager, identify overused and underused virtual machines for a selected object.

A virtual machine can be oversized in memory and undersized in CPU or the reverse. vCenter Operations Manager counts the virtual machine in both the oversized virtual machine count and in the undersized virtual machine count.

This double counting can be misleading because you might expect the values for powered-off, undersized, oversized, and idle virtual machines to add up to the total virtual machine value.

Prerequisites

Verify that you are logged in to a vSphere Client and that vCenter Operations Manager is open.

Procedure

- 1 In the inventory pane, select the object that you want to inspect.
- 2 Click the **Views** tab under the **Planning** tab and select **Virtual Machine Optimization - Summary**.

- 3 Examine the Total Virtual Machines, Powered-Off Virtual Machines, Undersized Virtual Machines, Oversized Virtual Machines, and Idle Virtual Machines values to determine how many machines assigned to this object can be optimized.

Table 4-1. Example of Virtual Machine Optimization - Summary

Virtual Machine Type	Number
Total Virtual Machines	12
Powered-Off Virtual Machines	0
Undersized Virtual Machines	6
Oversized Virtual Machines	6
Idle Virtual Machines	1

Identify Powered-Off Virtual Machines to Optimize Data

Powered-off virtual machines in your infrastructure are resources with capacity that you can reclaim.

Prerequisites

Verify that you are logged in to a vSphere Client and that vCenter Operations Manager is open.

Procedure

- 1 In the inventory pane, select the object that you want to inspect.
- 2 Click the arrow under the **Efficiency** badge to expand the detailed view.
- 3 In the Reclaimable Waste pane, identify the powered off virtual machines and delete the virtual click the **Reclaimable Waste** badge.
- 4 In the **Views** tab, select the **Powered-Off Virtual Machines** view.

The virtual machines that appear in this view are powered off and you can restart the machines in the vSphere Client.

What to do next

In the vSphere Client, determine why the virtual machine is powered off. If the virtual machine is obsolete, you can remove it from the inventory.

Identify Idle Virtual Machines to Optimize Capacity

Optimizing the capacity in the virtual environment involves identifying idle virtual machines that are powered on but not in use.

Prerequisites

Verify that you are logged in to a vSphere Client and that vCenter Operations Manager is open.

Procedure

- 1 In the inventory pane, select the object that you want to inspect.
- 2 Click the arrow under the **Efficiency** badge to expand the detailed view.
- 3 In the Reclaimable Waste pane, identify the powered off virtual machines and click the **Reclaimable Waste** badge.
- 4 In the **Views** tab, select the **Idle Virtual Machines - List** view.

The idle virtual machines in this view either do not perform any work or perform below a specified threshold.

- 5 Select the **Oversized Virtual Machines - List** view to evaluate candidate objects that can receive more work.

Identify Oversized Virtual Machines to Optimize Data

To optimize and right-size the capacity for your virtual environment, identify the oversized virtual machines and assign less capacity to those virtual machines.

Prerequisites

Verify that you are logged in to a vSphere Client and that vCenter Operations Manager is open.

Procedure

- 1 In the inventory pane, select the object that you want to inspect.
- 2 Click the arrow under the **Efficiency** badge to expand the detailed view.
- 3 In the **Views** tab, select the **Oversized Virtual Machines - List** view.

The virtual machines that appear in this view are underused and have more capacity than is required for the workload.

- 4 To determine how to update the CPU, check the value in the Recommended vCPU column.
- 5 (Optional) To examine a datacenter, run a **Capacity Overview Report** from the **Reports** tab.

What to do next

Assign more work to the underused virtual machines or reconfigure the capacity appropriate to the virtual machine load.

Determine the Trend of Waste for a Virtual Machine

To optimize the capacity for your virtual environment, determine the trend of powered off, idle, undersized, and oversized virtual machines over a period of time to help you identify wasted resources.

Prerequisites

Verify that you are logged in to a vSphere Client and that vCenter Operations Manager is open.

Procedure

- 1 In the inventory pane, select the object that you want to inspect.
- 2 Click the **Views** tab under the **Planning** tab and select the **Virtual Machine Waste and Stress -Trend** view.

The CPU, memory, disk I/O, and network resources trend charts appear in this view.

- 3 (Optional) To view the object resource data in a list, click the **Table** link.
- 4 To view the object resource data interval, select the timeframe from the **Interval** drop-down menu and click **Update**.

What to do next

Depending on the trend of wasted resources, reconfigure the capacity to be appropriate for the virtual machine load.

Forecasting Data for Capacity Risk

Forecasting data for capacity risk in vCenter Operations Manager involves creating capacity scenarios to examine the demand and supply of resources in the virtual infrastructure.

A what-if scenario is a supposition about how capacity and load change if certain conditions are changed, without making actual changes to your virtual infrastructure. If you implement the scenario, you know in advance what your capacity requirements are.

NOTE The What-if Scenario wizard is accessible only if you select a host or a cluster in the inventory pane.

vCenter Operations Manager assigns names, such as Add 1 New VM, to scenarios. The What-if Scenarios pane refreshes as each new scenario is applied in the view results. Scenarios persist until you delete them or until you refresh vCenter Operations Manager.

Create Capacity Scenarios for Virtual Machines With New Profiles

Virtual machine scenarios assess the consequences of adding a new virtual machine to a cluster or host without applying actual changes to your virtual environment.

To help you make configuration selections for virtual machines, the right pane of the What-If Scenario wizard contains population information that shows the total virtual machine use of the selected object and representative virtual machine data. vCenter Operations Manager calculates virtual machine data by partitioning the range of capacity for CPU, memory, and disk dimensions into thirds, assigning the virtual machines to bins based on configuration, and creating a profile for each bin where the capacity of the profile is the maximum configuration of the virtual machines in the bin and the use of the profile is the average usage of the virtual machines in the bin. The value of the virtual machines assigned to the profile and the use is the average of the virtual machines assigned to the profile. The right pane includes information on the smallest and largest hosts.

For information about relevant CPU and memory maximums, see the VMware vSphere documentation.

NOTE The What-if Scenario wizard is accessible only if you select a host or a cluster in the inventory pane.

Prerequisites

In vCenter Operations Manager, verify that the **Summary** tab under the **Planning** tab is open.

Procedure

- 1 Select the destination object in the inventory pane.
The destination object is a cluster or host where you locate the new virtual machines if you implement your scenario.
- 2 Click the **New what-if scenario** link.
The What-If Scenario wizard opens.
- 3 Select a view for the scenario and click **Next**.
This step is not available if you opened the What-if Scenario wizard from the **Views** tab.
- 4 On the Change Type page, select **Virtual machines** and click **Next**.
- 5 Select **Add virtual machines by specifying profile of new virtual machines** and click **Next**.

- 6 Set the virtual machine count and the configuration for the virtual machine.

Option	Description
vCPU Configuration	Number of virtual CPU cores that a target virtual machine will have, followed by the target processor core speed, in GHz or MHz.
vCPU Utilization	Expected average CPU use for this virtual machine.
vCPU Reservation	Required minimum of CPU resources that the virtual machine must have.
vCPU Limit	Amount of maximum CPU resources that the virtual machine can use.
Memory Reservation	Required minimum of memory for this virtual machine.
Memory Limit	Amount of maximum memory that the destination virtual machine can have.
Virtual Disk Type	Thin or Thick disk configuration. You might apply thin disk provisioning when you start with only the necessary partition and plan to grow it over time.
Virtual Disk Linked Clone	Shared space that uses linked clones. Linked clones involve delta disks that reference a master disk rather than a full copy of the entire virtual hard disk. For thick disks with linked clones, vCenter Operations Manager calculates linked clone capacity as one master copy that uses 100 percent of the specified disk size and the remaining copies use 10 percent delta disks. For thin disks with linked clones, vCenter Operations Manager uses the same calculation but the disk size multiplied by the use percentage defines the master copy size.
Virtual Disk Configuration	Disk size.
Virtual Disk Utilization	Expected average disk use for the virtual machine. The use percentage applies only to thin disks.

vCenter Operations Manager does not require you to specify the disk I/O and network I/O use of the new virtual machines, and instead uses the average disk I/O and network I/O use across virtual machines in the host or cluster as an estimation of the new virtual machine use.

- 7 Click **Next** when your configuration selections are complete.
- 8 On the Ready to Complete page, check the parameters of your what-if scenario and click **Finish** to view the outcomes.

vCenter Operations Manager applies the scenario to the view you selected and shows current capacity compared to the expected capacity if you add the virtual machines to the target object.

Create Capacity Scenarios for Virtual Machines With Existing Profiles

You can create a scenario that uses profiles of existing virtual machines as models to simulate adding one or more new virtual machines to a host or a cluster.

To help you make configuration selections for virtual machines, the right pane of the What-If Scenario wizard contains population information that shows the total virtual machine use of the selected object and representative virtual machine data. vCenter Operations Manager calculates virtual machine data by partitioning the range of capacity for CPU, memory, and disk dimensions into thirds, assigning the virtual machines to bins based on configuration, and creating a profile for each bin where the capacity of the profile is the maximum configuration of the virtual machines in the bin and the use of the profile is the average usage of the virtual machines in the bin. The value of the virtual machines assigned to the profile and the use is the average of the virtual machines assigned to the profile. The right pane includes information on the smallest and largest hosts.

For information about relevant CPU and memory maximums, see the VMware vSphere documentation.

NOTE The What-if Scenario wizard is accessible only if you select a host or a cluster in the inventory pane.

Prerequisites

In vCenter Operations Manager, verify that the **Summary** tab under the **Planning** tab is open.

Procedure

- 1 Select the destination object in the inventory pane.
The destination object is a cluster or host where you locate the new virtual machines if you implement your scenario.
- 2 Click the **New what-if scenario** link.
The What-If Scenario wizard opens.
- 3 Select a view for the scenario and click **Next**.
This step is not available if you opened the What-if Scenario wizard from the **Views** tab.
- 4 On the Change Type page, select **Virtual machines** and click **Next**.
- 5 Select **Add virtual machines using profiles of existing virtual machines as models** and click **Next**.
- 6 Select existing virtual machines from the list to use as profiles for the new virtual machines.
The list of the existing virtual machines applies to the datacenter of the selected object. The **Datacenter** and the **Cluster or Host** drop-down menus narrow the scope of the virtual machine list. The list provides CPU, memory, and disk information such as the used space and the use of thin disks or linked clones.
- 7 Click **Next**.
- 8 To duplicate any virtual machines, increase the virtual machine count and click **Next**.
- 9 On the Ready to Complete page, check the parameters of your what-if scenario and click **Finish** to view the outcomes.

vCenter Operations Manager applies the scenario to the view you selected and shows current capacity compared to the expected capacity if you add the virtual machines to the target object.

What to do next

If you have more than one scenario for a view, you can combine and compare the outcomes. To save the information, export the scenario results.

Create a Hardware Change Scenario

Before you purchase new hardware, you can create hardware change scenarios to determine if the purchase is necessary. To determine the effect of adding, removing, or updating the hardware capacity in a cluster, create a scenario that models changes to hosts and datastores.

Prerequisites

In vCenter Operations Manager, verify that the **Summary** tab under the **Planning** tab is open.

Procedure

- 1 Select the target host in the inventory panel.
The target host is where you simulate changes to the environment to examine possible outcomes.
- 2 Click the **New what-if scenario** link.
- 3 Select a view for the scenario and click **Next**.
This step is not available if you opened the What-if Scenario wizard from the **Views** tab.
- 4 On the Change Type page, select **Hosts & Datastores** and click **Next**.

- 5 Use the buttons to add, remove, or restore hosts in the host list.

Actions are applied only to hosts that you selected using the check boxes in the hosts list.

- 6 Click host rows to change the physical resources and click **Save**.

You can use the text boxes and drop-down menus to modify the CPU capacity and the memory size of the selected host.

Option	Description
CPU Total	Number of CPU cores that a target single host will have, followed by the target processor core speed.
Memory Total	Amount of memory that the target host profile will have.

- 7 Click **Next**.

- 8 Use the buttons to add, remove, or restore datastores in the datastores list.

Actions are applied only to datastores that you selected using the check boxes in the datastores list.

- 9 Click datastore rows to modify the disk size and click **Save**.

The Population Details pane to the right contains information about the actual datastore capacity, the disk I/O use, and the number of hosts that link the datastore. The sharing status indicates whether different hosts share the datastore.

- 10 Click **Next**.

- 11 On the Ready to Complete page, check the parameters of your what-if scenario and click **Finish** to view the outcomes.

vCenter Operations Manager applies the scenario to the view that you selected. The scenario forecast appears in the chart as a gray dotted line. You can compare the actual current capacity to the expected capacity if you apply the changes you specified in the hardware change scenario.

What to do next

If you have more than one scenario, you can combine or compare the scenario outcomes. You can export the scenario results to an Adobe PDF or CSV file to save the information.

Create a What-If Scenario to Remove Virtual Machines

You can create a scenario that simulates removing a virtual machine or group of virtual machines from a host or a cluster.

Prerequisites

In vCenter Operations Manager, verify that the **Summary** tab under the **Planning** tab is open.

Procedure

- 1 Select the target object in the inventory panel.

The target object identifies the host or the cluster from which the virtual machines are removed if you implement your scenario.

- 2 Click the **New what-if scenario** link.

- 3 Select a view for the scenario and click **Next**.

This step is not available if you opened the What-if Scenario wizard from the **Views** tab.

- 4 On the Change Type page, select **Virtual machines** and click **Next**.

- 5 Select **Remove virtual machines** and click **Next**.
- 6 On the Configuration page, select the virtual machines to remove from the selected host or cluster and click **Next**.
- 7 On the Ready to Complete page, check the parameters of your what-if scenario and click **Finish** to view the outcomes.

vCenter Operations Manager applies the scenario to the view that you selected. The forecasted capacity appears in the chart as a gray dotted line. You can compare the current capacity to the expected capacity if you remove the virtual machines from the target object.

What to do next

If you have more than one scenario, you can combine or compare the scenario outcomes. You can export the scenario results to an Adobe PDF or CSV file to save the information.

Combine the Results of What-If Scenarios

You can combine the results of all what-if scenarios to assess their cumulate effect on your environment.

The list of scenarios that you created appears in the What-If Scenarios pane under the Legend pane.

Prerequisites

In vCenter Operations Manager, verify that the **Views** tab under the **Planning** tab is open.

Verify that you have created at least two what-if scenarios.

Procedure

- 1 In the What-If Scenarios pane, select **Combine** from the drop-down menu.
The combined values for all what-if scenarios appear as dotted lines in the **Forecasted** area of the view.
- 2 To view aggregate scenario values in tabular form, click the **Table** link.

What to do next

You can compare the results of different what-if scenarios to determine the best course of action.

Compare the Results of What-If Scenarios

You can compare a scenario result to the actual capacity of your environment and to other scenario results and determine the best course of action.

The list of scenarios that you created appears in the What-If Scenarios pane under the Legend pane.

Prerequisites

In vCenter Operations Manager, verify that the **Views** tab under the **Planning** tab is open.

Procedure

- 1 In the What-If Scenarios pane, select **Compare** from the drop-down menu.
Existing data and scenario data appear in different line styles in the **Forecasted** area of the view.
- 2 (Optional) To view scenario results in tabular form, click the **Table** link.
The table view contains separate columns to show the effect of the simulated change.

What to do next

You can combine scenario results to assess the cumulative effect of all scenarios.

Delete a Scenario from the What-If Scenarios List

You can remove scenarios in the What-If Scenarios pane if you do not need them.

The list of scenarios that you created appears in the What-If Scenarios pane under the Legend pane.

When you finish examining a what-if scenario, you can delete it.

Prerequisites

In vCenter Operations Manager, verify that the **Views** tab under the **Planning** tab is open.

Procedure

- 1 To delete a what-if scenario, click the **X** icon to the right of the scenario name.
A confirmation dialog box opens.
- 2 Click **Yes** to confirm the deletion and return to the **Views** tab.

vCenter Operations Manager refreshes the view in the Details pane to remove the data from the scenario.

Planning vCenter Operations Manager Workflow with Alerts

5

Planning your workflow in a vCenter Operations Manager virtual environment involves identifying alerts to respond to, maintaining alerts, and identifying alert trends.

Alerts in vCenter Operations Manager are available for all of the minor badges. Alert messages provide an alternate path to identify and resolve issues.

This chapter includes the following topics:





- [“What Is an Alert in vCenter Operations Manager,”](#) on page 49
- [“Filter Alerts to Identify Notifications,”](#) on page 50
- [“Identify Capacity Related Alerts,”](#) on page 51
- [“Identify the Overall Trend of Alert Types,”](#) on page 51
- [“Maintaining vCenter Operations Manager Alerts,”](#) on page 52

What Is an Alert in vCenter Operations Manager

vCenter Operations Manager generates alerts when events occur on the monitored objects, when data analysis indicates deviations from normal metric values, or when a problem occurs with one of the vCenter Operations Manager components.

The Alert Volume Chart

The Alert Volume chart is a graphical representation of the number of alerts that were activated during the last 7 days. The color coding in the graph represents the level of criticality of alerts. The number of currently active alerts of each criticality level appears to the right of the graph.

Alert Icon	Description
	Critical alert. You must act immediately.
	Immediate alert. Act as soon as possible.
	Warning alert. Check the condition of the selected object.
	Information alert.

The Alert Volume chart helps you visually assess what is the overall volume of alerts triggered in your environment, what is the ratio between alerts of different criticality, and what criticality level prevails in your environment.

Types of Alerts

vCenter Operations Manager generates several types of alerts. Double-click alerts in the list to view the alert details.

Badge Score Alerts

Badge score alerts are triggered when a badge changes its color. Badge colors change based on the hard thresholds that you set in the Configuration dialog box. Alerts can be triggered for the Workflow, Anomalies, Time Remaining, Capacity Remaining, Stress, Waste, and Density badges. You can select which badges activate alerts in the Configuration dialog box.

Fault Alerts

The color of the Faults badge changes based on the number of events that occurred in the virtual infrastructure that you monitor. vCenter Operations Manager does not weigh the importance of events, and the Faults badge color might remain unchanged if a single event occurs. As a result, you might miss an isolated, but critical fault event that occurred on the vCenter Server. Therefore, fault alerts are triggered when an individual event occurs and are not related to the color of the Faults badge. You can enable and disable fault alerts in the Configuration dialog box.

Administrative Alerts

Administrative alerts are displayed only when the World object is selected in the navigation tree. Administrative alerts are related to problems on the vCenter Operations Manager system and virtual environment and do not affect monitored objects, but affect the proper operation and data collection of the application. Administrative alerts can be two types.

Administrative Alert Type	Description
System alert	A component of the vCenter Operations Manager application has failed.
Environment alert	vCenter Operations Manager has stopped receiving data from one or more resources. This might indicate a problem with the resource or the network infrastructure.

External Alert Notifications

An administrator can configure vCenter Operations Manager to send email and SNMP notifications when an alert triggers. SMTP and SNMP notifications are set on the vCenter Operations Manager Administration Web page. The URL format is **https://VM-IP/admin/**, where *VM-IP* is the IP address or fully qualified host name of the *UI VM* virtual machine that is part of the vCenter Operations Manager virtual appliance.

Filter Alerts to Identify Notifications

Filter the alerts in your virtual environment to easily identify notifications by time, severity, and duration.

Prerequisites

Verify that you are logged in to a vSphere Client and that vCenter Operations Manager is open.

Procedure

- 1 In the inventory pane, select the object that you want to inspect.
- 2 Click the **Alerts** tab to view a list of active alerts.

- 3 In the Alerts list, filter the alerts by columns or select an alert icon.

Option	Action
To view the most critical alerts that need immediate attention.	Select the Criticality column.
To filter badge alerts in the object.	Select the Type column.
To filter sub-badge alerts in the object.	Select the Sub-Type column.
To view the most recent alerts in the object.	Select the Start Time column.
To filter the duration of the alert to identify the alerts that the administrator has not attended to.	Select the Duration column.
To view the Administrative alerts in the object.	Select the Administrative Alert icon.
To view the System alerts in the object.	Select the System icon.
To view the Environment alerts in the object.	Select the Environment icon.

What to do next

To investigate the possible causes of an alert, double-click the alert for details.

Identify Capacity Related Alerts

Capacity related alerts might be triggered because of resources running out of capacity, stressed virtual machines, or resources wasting memory.

Prerequisites

Verify that you are logged in to a vSphere Client and that vCenter Operations Manager is open.

Procedure

- 1 In the inventory pane, select the object that you want to inspect.
- 2 Click the **Alerts** tab to view a list of active alerts.
- 3 In the Alerts list, filter the list by the **Capacity Remaining** badge to view alerts that address capacity.

When you double-click an alert, vCenter Operations Manager opens a pop-up window displaying the alert details.

What to do next

To find aggregate information for used and total capacity and capacity trends, click the **Views** tab under the **Planning** tab and select the **Capacity** badge.

Identify the Overall Trend of Alert Types

You can use the overall trend of alert types to identify the number of critical alerts over a period of time.

Prerequisites

Verify that you are logged in to a vSphere Client and that vCenter Operations Manager is open.

Procedure

- 1 In the inventory pane, select the object that you want to inspect.

- 2 Click the **Alerts** tab to view a list of active alerts.
- 3 To view the alert distribution across the last seven days, check the **Alert Volume** graph.

A trend in alerts typically indicates a problem to investigate. Over time, you might also want to customize alert settings, which will be reflected in the trend display.

Maintaining vCenter Operations Manager Alerts

Maintaining alerts in the vCenter Operations Manager environment requires administrative privileges.

After identifying an alert from the Alerts list, administrators can take and release ownership of the alert, suspend, suppress, or cancel an alert.

- [Take Ownership of an Alert](#) on page 52
Users can take ownership of alerts in the Alerts list.
- [Release Ownership of an Alert](#) on page 53
If you are no longer responsible for an alert or want to let other users take ownership of that alert, you must release the ownership.
- [Suppress an Alert](#) on page 53
You can hide an alert from the Alerts list for a specific number of days.
- [Suspend an Alert](#) on page 54
You can hide an alert from the Alerts list for a specific number of minutes.
- [Cancel a Fault Alert](#) on page 54
You can deactivate fault alerts if they are no longer valid.

Take Ownership of an Alert

Users can take ownership of alerts in the Alerts list.


Owning an alert means that you are responsible for taking the necessary remediation actions, and prevents other users from suspending or suppressing the alert. This can reduce overlapping efforts when multiple operators manage alerts. The user names of alert owners appear in the User Name column of the Alerts list.

IMPORTANT Only owners can suspend or suppress the alerts they own.

Prerequisites

Verify that you are logged in to a vSphere Client, and vCenter Operations Manager is open.

Procedure

- 1 Click the **Alerts** tab.
- 2 In the Alerts list, click the alert you want to own.
- 3 (Optional) To select multiple alerts in the list, press the Shift or Control key and click to select the alerts.
- 4 Click the **Take Ownership** button .
- 5 Click **Yes** to confirm.

The alert appears as Assigned in the Control State column of the alert list.


Release Ownership of an Alert

If you are no longer responsible for an alert or want to let other users take ownership of that alert, you must release the ownership.

Prerequisites

Verify that you are logged in to a vSphere Client, and vCenter Operations Manager is open.

Procedure

- 1 Click the **Alerts** tab.
- 2 In the Alerts list, click one of the alerts that you own.
- 3 (Optional) To select multiple alerts in the list, press the Shift or Control key and click to select the alerts.
- 4 Click the **Release Ownership** button .
- 5 Click **Yes** to confirm.

Your user name is removed from the User Name column of the Alerts list.

Suppress an Alert

You can hide an alert from the Alerts list for a specific number of days.

When you suppress an alert, you take ownership of this alert.


NOTE You cannot suppress an alert owned by another user.

Prerequisites

Verify that you are logged in to a vSphere Client, and vCenter Operations Manager is open.

NOTE You don't need administrative privileges to suppress or suspend alerts.

Procedure

- 1 Click the **Alerts** tab.
- 2 In the Alerts list, click the alert you want to suppress.
- 3 (Optional) To select multiple alerts in the list, press the Shift or Control key and click to select the alerts.
- 4 Click the **Suppress** button .
- 5 In the Confirm dialog box, type the number of days to suppress the alert for, and click **OK**.

By default, vCenter Operations Manager hides suppressed and suspended alerts from the Alerts list for the period you specified. You can use the filters in the Control State column header to show or hide suppressed and suspended alerts.

If the problem still exists when the period you specified expires, vCenter Operations Manager reactivates the alert and the alert appears in the Alerts list. Your user name remains assigned as the alert owner.

Suspend an Alert

You can hide an alert from the Alerts list for a specific number of minutes.


When you suspend an alert, you take ownership of the alert.

NOTE You can suspend only alerts that are not owned by another user.

Prerequisites

Verify that you are logged in to a vSphere Client, and vCenter Operations Manager is open.

Procedure

- 1 Click the **Alerts** tab.
- 2 In the Alerts list, click the alert you want to suspend.
- 3 (Optional) To select multiple alerts in the list, press the Shift or Control key and click to select the alerts.
- 4 Click the **Suspend** button .
- 5 In the Confirm dialog box, type the number of minutes to suspend the alert for, and click **OK**.

By default, vCenter Operations Manager hides suppressed and suspended alerts from the Alerts list for the period you specified. You can use the filters in the Control State column header to show or hide suppressed and suspended alerts.

If the problem still exists when the period you specified expires, vCenter Operations Manager reactivates the alert and the alert appears in the Alerts list. Your user name remains assigned as the alert owner.

Cancel a Fault Alert


You can deactivate fault alerts if they are no longer valid.

Fault alerts are triggered by events that are retrieved from the vCenter Server. In order to deactivate a fault alert, vCenter Operations Manager must receive another event notification when the problem on the vCenter Server is resolved. If vCenter Operations Manager does not receive such an event, the fault alert remains active. Because faults contribute to the Health badge score, active fault alerts degrade the health score even if the problems that triggered them are solved. Therefore, on rare occasions, you might need to deactivate outdated fault alerts manually.

Prerequisites

Verify that you are logged in to a vSphere Client, and vCenter Operations Manager is open.

Procedure

- 1 Click the **Alerts** tab.
- 2 In the Alerts list, click the fault alert you want to deactivate.
You can press the Shift or Control key while you click to select multiple alerts in the list.
- 3 (Optional) To select multiple alerts in the list, press the Shift or Control key and click to select the alerts.
- 4 Click the **Cancel Fault Alert** button .
- 5 Click **Yes** to confirm.

The canceled fault alert is removed from the Alerts list and vCenter Operations Manager updates the Fault badge score and the Health Score.

NOTE Badge scores are not refreshed in real time. These values are refreshed on each data collection cycle. The data collection interval is five minutes by default.

Customizing vCenter Operations Manager Configuration Settings

6

Customization of configuration settings include assigning operational responsibilities and receiving notifications when badges cross thresholds.

This chapter includes the following topics:

- [“Customize the Badge Thresholds for Infrastructure Objects,”](#) on page 57
- [“Customize the Badge Thresholds for Virtual Machine Objects,”](#) on page 58
- [“Default Badge Threshold Values,”](#) on page 58
- [“Edit Configuration Settings to Receive Notifications When a Badge Crosses a Threshold,”](#) on page 61

Customize the Badge Thresholds for Infrastructure Objects

You can modify the default badge threshold levels for virtual infrastructure objects so that your own ranges appear in the vCenter Operations Manager **Dashboard** and **Operations** tabs.

An administrator can modify the default settings of vCenter Operations Manager at any time. The changes that the administrator applies affect all users. Therefore, the administrator must notify other users who are working with vCenter Operations Manager about new settings that are applied.

Prerequisites

Verify that you are logged in to a vSphere Client as an administrator, and vCenter Operations Manager is open.

Procedure

- 1 Click the **Configuration** link on the main vCenter Operations Manager page.
The **Configuration** dialog box appears.
- 2 In the Badges & Alerts navigation section, click **Infrastructure Badge Thresholds**.
- 3 Slide the color icons on the selected axis to modify the default values and set the ranges to show green, yellow, orange, or red badge.

NOTE You cannot revert the changes you apply to badge thresholds. Therefore, [“Default Badge Threshold Values,”](#) on page 58 lists the default threshold values for your reference.

- 4 (Optional) To enable or disable a color range for a badge, click the icon of that color.

Only the outlines of the icon that you disabled remain on the axis.

If the badge score crosses the threshold marked by the disabled icon, the badge color does not change.

vCenter Operations Manager does not trigger alerts derived from disabled badge thresholds.

- 5 Click **OK** to save your settings and close the Configuration dialog box.

Badge thresholds are updated. The badge colors will change when the next collection cycle begins.

NOTE Depending on your selection in the **Alert Management** section of the Configuration dialog box, new badge thresholds might affect the number of alerts that vCenter Operations Manager generates.

Customize the Badge Thresholds for Virtual Machine Objects

You can modify the default badge threshold levels for virtual machines so that your own ranges appear in the vCenter Operations Manager **Dashboard** and **Operations** tabs.

An administrator can modify the default settings of vCenter Operations Manager at any time. The changes that the administrator applies affect all users. Therefore, the administrator must notify other users who are working with vCenter Operations Manager about new settings that are applied.

Prerequisites

Verify that you are logged in to a vSphere Client as an administrator, and vCenter Operations Manager is open.

Procedure

- 1 Click the **Configuration** link on the main vCenter Operations Manager page.
The **Configuration** dialog box appears.
- 2 In the Badges & Alerts navigation section, click **VM Badge Thresholds**.
- 3 Slide the color icons on the selected axis to modify the default values and set the ranges to show green, yellow, orange, or red badge.

NOTE You cannot revert the changes you apply to badge thresholds. Therefore, [“Default Badge Threshold Values,”](#) on page 58 lists the default threshold values for your reference.

- 4 (Optional) To enable or disable a color range for a badge, click the icon of that color.
Only the outlines of the icon that you disabled remain on the axis.
If the badge score crosses the threshold marked by the disabled icon, the badge color does not change.
vCenter Operations Manager does not trigger alerts derived from disabled badge thresholds.
- 5 Click **OK** to save your settings and close the Configuration dialog box.

Badge thresholds are updated. The badge colors will change when the next collection cycle begins.

NOTE Depending on your selection in the **Alert Management** section of the Configuration dialog box, new badge thresholds might affect the number of alerts that vCenter Operations Manager generates.

Default Badge Threshold Values

If you modify the default badge thresholds in the Configuration window, you cannot reset to the default values.

Because you cannot revert the changes you apply to badge thresholds, [Table 6-1](#) lists the default badge threshold values for your reference.

Table 6-1. Default Badge Threshold Values










































Badge	Icon	Status	Default Score Range for Infrastructure	Default Score Range for VM
Health		Good	100-76	100-76
		Abnormal	75-51	75-51
		Degraded	50-26	50-26
		Bad	25-0	25-0
Workload		Good	0-79	0-84
		Abnormal	80-89	85-94
		Degraded	90-94	95-100
		Bad	>95	>100
Anomalies		Good	0-49	0-49
		Abnormal	50-74	50-74
		Degraded	75-89	75-89
		Bad	90-100	90-100
Faults		Good	0-24	0-24
		Abnormal	25-49	25-49
		Degraded	50-74	50-74
		Bad	75-100	75-100
Risk		Good	0-49	0-49
		Abnormal	50-74	50-74
		Degraded	75-100	75-100
		Bad	100	100
Time Remaining		Good	100-51	100-51
		Abnormal	50-26	50-26

Table 6-1. Default Badge Threshold Values (Continued)

Badge	Icon	Status	Default Score Range for Infrastructure	Default Score Range for VM
Capacity Remaining		Degraded	25-1	25-1
		Bad	0	0
		Good	100-51	100-51
		Abnormal	50-26	50-26
		Degraded	25-1	25-1
Stress		Bad	0	0
		Good	0	0
		Abnormal	1-4	1-4
		Degraded	5-9	5-9
		Bad	>10	>10
Efficiency		Good	100-26	100-26
		Abnormal	25-11	25-11
		Degraded	10-1	10-1
		Bad	0	0
Reclaimable Waste		Good	0-74	0-74
		Abnormal	75-89	75-89
		Degraded	90-99	90-99
		Bad	100	100
Density		Good	100-26	100-26
		Abnormal	25-11	25-11
		Degraded	10-1	10-1
		Bad	0	0

Edit Configuration Settings to Receive Notifications When a Badge Crosses a Threshold

Administrators of the vCenter Operations Manager virtual environment set notifications when a badge crosses a threshold, to identify and troubleshoot a problem immediately after it occurs.

Prerequisites

Verify that you are logged in to a vSphere Client as an administrator, and vCenter Operations Manager is open.

Verify that the SMTP notifications are set on the vCenter Operations Manager Administration portal.

Procedure

- 1 Click the **Notifications** link on the main vCenter Operations Manager page.
- 2 In the Notification dialog box, click the **Add Rule** icon to add a new notification rule.
- 3 Type a rule name.
- 4 Type the email addresses to which to send the notification.
- 5 Select the alert types and severity levels that trigger the notification.
- 6 To receive notifications from all child objects, select **Include Children**.
- 7 To receive notifications from a specific child object, select **Include Children** > *<ObjectName>*.

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